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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/809,867	03/26/2004	Masanori Ueda	025720-00027	7607

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EXAMINER

TUGBANG, ANTHONY D

ART UNIT	PAPER NUMBER
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3729

DATE MAILED: 06/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/809,867

Applicant(s)

UEDA ET AL.

Examiner

A. Dexter Tugbang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 March 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) 5-10 and 14-17 is/are withdrawn from consideration:
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 11-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of the invention of Group I-A, Claims 2-4 in the reply filed on March 13, 2006 is acknowledged.
2. Claims 5-10 and 14-17 have been withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on March 13, 2006.

Specification

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: --A Method of Fabricating a Surface Acoustic Wave Device --.

Claim Objections

4. Claims 1, 2 and 4 are objected to because of the following informalities: the language in each is awkwardly worded and the following suggestions are offered to clarify the language.

The changes suggested below in no way affect the scope of the claimed invention.

In Claim 1, "thereof" (line 5) should be removed; "another surface thereof" (lines 9-10) should be replaced with --another surface of the supporting substrate--; and "comb-like" (line 14) should be replaced with --comb shaped--.

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In Claim 2, "forms" (line 2) should be replaced with --further comprises forming--; --the-
- should be inserted before "grinded" (line 5); --the-- should be inserted before "piezoelectric"
(line 6); and --on-chip-- should be inserted before "patterns" (line 7).

In Claim 3, a comma --,-- should be inserted after "oxygen" (line 6).

Appropriate correction is required.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1, 2, 3, 11 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Onishi et al 6,426,583, Beyne et al 5,731,584, and Kawaura et al 4,426,595.

Regarding Claim(s) 1, Onishi discloses a method of fabricating a surface acoustic wave device (Figures 9A through 9E, col. 6, lines 54+) comprising: joining a supporting substrate (e.g. 102a in Fig. 9A) to a second surface of a piezoelectric substrate 101a opposite to a first surface; grinding and polishing the first surface (top surface of 101a) of the piezoelectric substrate; grinding a third surface (bottom surface of 102a) of the supporting substrate opposite another surface (top surface of 102a) of the supporting substrate to which the second surface (bottom surface of 101a) of the piezoelectric substrate is joined; and forming, on the first surface of the piezoelectric substrate, an on-chip pattern including comb shaped electrodes (e.g. 104).

Regarding Claim(s) 2, Onishi further teaches forming the on-chip pattern two-dimensionally and cutting a joined substrate having the grinded and polished supporting substrate and the piezoelectric substrate into parts each of which parts has a respective one of the on-chip patterns arranged two-dimensionally (see cutting sequence of Figs. 9D to 9E). Note that the claimed “joined substrate” is read as the joining of supporting substrate 102a and piezoelectric substrate 101a (in Fig. 9B) after each has been grinded or thinned, and subsequently, this joined substrate (e.g. 101a, 102a in Fig. 9B) is cut (as shown in Fig. 9E).

Regarding Claim(s) 3, Onishi further teaches housing each of the parts into a respective cavity formed in a first substrate (e.g. 301 and cross-hatched layers not labeled above 301 in Fig. 11), and sealing the respective cavity with a second substrate (e.g. 305).

Regarding Claim(s) 11 and 13, Onishi further suggests that the supporting substrate can be made of silicon such that it is a silicon substrate (col. 4, lines 47-50) and that the piezoelectric substrate contains a major component of lithium niobate (col. 4, lines 33-37).

Regarding Claim(s) 1, Onishi teaches grinding of the third surface of the supporting substrate, but does not mention polishing of the third surface. Furthermore, Onishi does not mention that electrode pads are formed on the first surface of the piezoelectric substrate.

Beyne suggests that a surface of a supporting substrate (e.g. 11), made of the very same material of silicon, can be flattened and thinned by conventional steps of both grinding and polishing (col. 4, lines 17-28).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of Onishi by adding the polishing step, along with

grinding, on the third surface of the supporting substrate, as taught by Beyne, to positively flatten and thin the supporting substrate to achieve a certain thickness or dimension.

Kawaura teaches that electrode pads (e.g. P₁, P₂, P₃ or P₄) can be formed with comb shaped electrodes to provide an electrical connection and signal to the on-chip pattern of electrode pads and comb shaped electrodes on the surface acoustic wave device (col. 3, lines 20-27).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of Onishi by adding the electrode pads to the on-chip pattern, as taught by Kawaura, to positively provide an electrical connection and signal to the surface acoustic wave device and allow the device to operate.

7. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Onishi et al, Kawaura et al, and Beyne et al, as applied to Claims 1, 2 and 3 above, and further in view of European Patent 0 557 756, referred to hereinafter as EP'756.

Onishi, as modified by Kawaura and Beyne, discloses the claimed manufacture method as relied upon above. The modified Onishi method does not teach subjecting one of the joining surfaces of the first and second substrates to a surface activation process that uses plasma and oxygen.

It is noted that sealing of the first and second substrates of Onishi is accomplished by soldering.

EP'756 teaches that substrates, prior to be joined (by soldering) can be cleaned in a preliminary step with a surface activation process of plasma and oxygen (Abstract).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Onishi by including a surface treatment process of plasma and oxygen on the surface of either the first or second substrate, as taught by EP'756, to provide a clean surface for joining of the first and second substrates (by soldering).

8. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Onishi et al, Kawaura et al, and Beyne et al, as applied to claim 1 above, and further in view of Romanofsky 6,292,143.

Onishi, as modified by Kawaura and Beyne, discloses the claimed manufacture method as relied upon above, further including that the supporting substrate can be made of silicon. The modified Onishi method does not teach that the resistivity of the supporting substrate with silicon is $100\ \Omega - m$.

Romanofsky teaches that forming a substrate using high resistivity silicon provides the substrate with a resistivity of $1000\ \Omega - cm$ (equal to $100\ \Omega - m$) and is advantageous because of the semiconductor properties (col. 8, lines 50+).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the supporting substrate of Onishi by forming the supporting substrate with high resistivity silicon, as taught by Romanofsky, to advantageously provide the supporting substrate with a resistivity of $1000\ \Omega - cm$ (equal to $100\ \Omega - m$) and semiconductor properties.

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Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to A. Dexter Tugbang whose telephone number is 571-272-4570.

The examiner can normally be reached on Monday - Friday 8:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter Vo can be reached on 571-272-4690. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

**A. Dexter Tugbang
Primary Examiner
Art Unit 3729**

May 23, 2006